

$$\textcircled{1} \int \sec^2 4x \, dx$$

$$\textcircled{2} \int 4 \sin^4 2x \cos 2x \, dx$$

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$$u = 4x \\ du = 4dx$$

$$\frac{du}{4} = dx$$

$$\int \sec^2 u \left(\frac{du}{4}\right) = \frac{1}{4} \int \sec^2 u \, du$$

$$\hookrightarrow \frac{1}{4} \tan u + c = \boxed{\frac{1}{4} \tan 4x + c}$$

$$\textcircled{2} \int 4 \sin^4 2x \cos 2x \, dx$$

$$u = \sin 2x$$

$$du = \cos 2x (2) dx$$

$$\frac{du}{2} = \cos 2x \, dx$$

$$4 \int u^4 \left(\frac{du}{2}\right) = 2 \int u^4 \, du = \frac{2u^5}{5} + c = \boxed{\frac{2 \sin^5 2x}{5} + c}$$